CHAPTER 4 RESEARCH RESULTS

4.1 Descriptive Analysis

This study uses Statistical Package for Social Sciences (SPSS) version 16.0 for Windows to analyse the data collected from sixty (60) firms for a period of five years from 2004 to 2008.

The summary of data for all dependent variable and independent variables are presented in appendices as listed below:

Appendix 1 Summary of Data for Debt Ratio
Appendix 2 Summary of Data for Firm Size
Appendix 3 Summary of Data for Interest Coverage Ratio
Appendix 4 Summary of Data for Tangibility
Appendix 5 Summary of Data for Profitability
Appendix 6 Summary of Data for Growth Opportunities

The results of analyses for correlation, regression, Mann-Whitney U Test, and T-Test are presented in appendices as listed below:

Appendix 7 Regression Result: Debt Ratio on Firm Size, Interest Coverage Ratio, Tangibility, Profitability, and Growth Opportunities with Dummy Variable
Appendix 8 Regression Result: Debt Ratio on Firm Size, Interest Coverage Ratio, Tangibility, Profitability, and Growth Opportunities without Dummy Variable
Appendix 9 Mann-Whitney U Test Result: Test for Capital Structure

between Firms with More and Less than 50% of Debt Ratio

Appendix 10 T-Test Result: Test for Firm Size between Firms with More and Less than 50% of Debt Ratio

Appendix 11 T-Test Result: Test for Interest Coverage Ratio between Firms with More and Less than 50% of Debt Ratio

Appendix 12 T-Test Result: Test for Tangibility between Firms with More and Less than 50% of Debt Ratio

Appendix 13 T-Test Result: Test for Profitability between Firms with More and Less than 50% of Debt Ratio

Appendix 14 T-Test Result: Test for Growth Opportunities between Firms with More and Less than 50% of Debt Ratio

The average and standard deviation results for dependent variable, all five independent variables, and one dummy variable are summarized in Table 4.1 and are also presented in Appendix 7 in the table of Descriptive Statistics.

Table 4.1: Descriptive Statistics of the Model

Variable	Mean	Std. Deviation	N
DR	0.444	0.234	300
SIZ	5.004	1.425	300
ICR	7.233	10.833	300
TAN	0.437	0.155	300
PRO	0.031	0.066	300
GRO	0.893	0.345	300
DUM_50	0.470	0.500	300

The outlier is checked by inspecting Casewise Diagnostics table in Appendix 7. It is noticed that only one case (3.187) has standardized residual value above 3.0. This is less than one (1) percent of total cases falling outside the

range and thus it is accepted as a normally distributed sample (Pallant, 2009, p. 158). A further investigation is done by inspecting the value of Cook's Distance as presented in Residuals Statistics table in Appendix 7. The maximum value is found to be 0.075. According to Tabachnick and Fidell (2007, p. 75), case with value less than 1 is considered normal.

The assumptions of normality, linearity, homoscedasticity, and independence of residuals are inspected by using Normal Probability Plot (P-P) of Regression Standardized Residual and Scatterplot (Pallant, 2009, p. 156) as presented in Appendix 7. Normal P-P Plot shows all points lie in a reasonably straight diagonal line from bottom left to top right. This suggests no major deviation from normality. The potential effect of homoscedasticity and other assumptions are checked through Scatterplot of standardized residuals. The data is reasonably scattered in a centralized rectangular shape (the segregation of two groups is well taken care by the dummy variable of debt ratio) which suggests that no major violation of assumptions.

Bivariate correlation is used to investigate if there is any significant strong relationship between any two of the independent variables. This is done as part of the efforts to avoid potential multicollinearity. According to the Correlations table in Appendix 7, the highest value of correlation between any two independent variables is 0.589 (between ICR and PRO) which is less than 0.7 (Pallant, 2009, p.155). Therefore, all independent variables are to be retained. Further examination is performed and presented in the column of Collinearity Statistics in Coefficient table under Appendix G. The tolerance

values for all five independent variables are found to be above 0.10 (range from 0.527 to 0.931) and the values of variance inflation factor (VIF) are found to be smaller than 10 (range from 1.074 to 1.897). These indicate that regression analysis has not violated the multicollinearity assumption (Pallant, 2009, p.156) and thus multicollinearity does not pose a problem to the proposed regression model.

Autocorrelation is checked by performing Durbin-Watson test. The table of Model Summary in Appendix 7 indicates that Durbin-Watson value is 1.992. Therefore, this model is free from autocorrelation with a value close to 2 (Hill, Griffiths, and Lim, 2008, p. 239).

Based on the above results, the recommended model is said to be meeting the requirements for regression analysis. More details of the results are to be discussed in the following sub-chapters.

4.2 The Relationship between Firm Size and Capital Structure

The bivariate correlation is performed to investigate the relationship between the dependent variable and the five independent variables and a dummy variable. Details of the results are presented in Appendix 7. The summary of the result between debt ratio and firm size is presented in Table 4.2 as below.

Table 4.2: Summary of Pearson Correlation between SIZ and DR

Parameter	SIZ and DR
Pearson Correlation	0.185
Significance (1-tailed)	0.001
N	300

The positive value of Pearson correlation indicates that debt ratio and firm size have positive relationship. On the other hand, the significance value of 0.001 indicates that this positive relationship is significant at 0.01 level or 99% confidence level.

The above result suggests that null hypothesis 1 is rejected. Instead, the alternative hypothesis is accepted. There is a statistically significant positive relationship between firm size and debt ratio at the level of $\alpha = 0.05$.

The positive relationship result is consistent with majority of the studies (Al-Najjar, 2008; Dalbor and Upneja, 2002; Deesomsak et al., 2004; D'Mello and Farhat, 2008; Eriotis et al., 2007; Fraser et al., 2006; Huang and Song, 2006; Pandey, 2004; Psillaki and Daskalakis, 2009; Tan, 2005). This suggests that larger firms tend to adopt a strategy of higher debt ratio. A large firm tends to be a consistently growing company with more diversification and is less prone to bankruptcy. Therefore the prospect of the company is more promising and the company is more stable. The creditors will have more confidence on the ability of these companies in servicing the debt and thus more willingly to provide loans. Investors are also more likely to buy the bonds issued by a larger firm considering their capability in serving the coupon payment and a

relatively lower default risk than a smaller firm. Since the sample of this study is taken from the public listed companies, it gives more transparency to the creditors and investors about the financial status of the firms. This definitely helps to increase their confidence to lend out the money or purchase the bonds from a larger company.

This result indicates that trade-off theory is more appropriate in explaining the behaviour of capital structure in relation to firm size for manufacturing firms in Malaysia. Large firms prefer to borrow with a higher debt ratio than the small firms by taking a trade-off between agency costs and monitoring costs.

4.3 The Relationship between Interest Coverage Ratio and Capital Structure

The result of bivariate analysis between Interest Coverage Ratio and debt ratio as presented in Appendix 7 is reported in Table 4.3.

Table 4.3: Summary of Pearson Correlation between ICR and DR

Parameter	ICR and DR
Pearson Correlation	-0.480**
Significance (1-tailed)	0.000
N	300
** Correlation is significant at the 0.01 level (1-tailed).	

A negative value of 0.480 is obtained for Pearson correlation together with a significance value of 0.000. Therefore, null hypothesis 2 is rejected and

alternative hypothesis 2 is supported based on this result. This indicates that interest coverage ratio has a negative and statistically significant relationship with capital structure.

The negative relationship between capital structure and interest coverage ratio well matches with the findings from previous studies by Eriotis et al. (2007), Harris and Raviv (1990) and Mat Kila and Wan Mahmood (2008). An increase in debt financing results in a stronger financial distress faced by firms. Therefore, it causes a higher risk in default for debt payment. Since interest coverage ratio is a measurement of default probability, it implies that a higher interest coverage ratio indicates a lower debt ratio.

This result indicates that trade-off theory is more appropriate in explaining the behaviour of capital structure in relation to interest coverage ratio for manufacturing firms in Malaysia. A firm with higher interest coverage ratio will choose to have a lower debt ratio and thus face lesser financial distress.

4.4 The Relationship between Tangibility and Capital Structure

Table 4.4 summarizes the Pearson correlation result between tangibility and debt ratio. This result is extracted from Appendix 7.

Table 4.4: Summary of Pearson Correlation between TAN and DR

Parameter	TAN and DR
Pearson Correlation	-0.022
Significance (1-tailed)	0.350
N	300

Pearson correlation result is -0.022 with a significance value of 0.350. This result portrays that tangibility has a negative relationship with debt ratio. However, the large significance value (0.350) also indicates that the relationship of tangibility and debt ratio is statistically insignificance at alpha equal to 0.05. Therefore, null hypothesis 3 is accepted which means there is no relationship between tangibility and debt ratio at 0.05 significance level.

This result is different compared to the findings of many researchers as most of them suggest a positive relationship between capital structure and tangibility. However, it is consistent with the finding of Deesomsak et al. (2004) for Malaysian firms. They argue that two reasons contribute to this result. The tight family held and concentrated ownership and the close relationship of firms with their lenders result in a lesser need for collateral to secure for firms borrowings. The author believes that a high percentage of subsidiaries firms also source funding from their holding companies which do not demand for high level of collateral. Therefore, tangibility is less critical in influencing capital structure. In addition, the cross share holding amongst some of the Malaysian firms also causes collateral less critical in securing inter-company debt financing.

Although the correlation test result shows that there is no significant relationship between tangibility and capital structure, the regression model discusses in sub-chapter 4.7 and 4.9 later gives a different outcome. The coefficient of tangibility estimated at 0.09029 by the regression model shows that capital structure is statistically significant positive relationship with tangibility at significance level of 0.05. These two results explain that tangibility (with a proxy of tangible fixed assets over total assets) alone is not a significant factor in determining the level of debt ratio for manufacturing firms in Malaysia. However, it becomes a significant factor (at α = 0.05) when uses together with other determinants to predict the capital structure of firms. Anyway, according to the result as discussed in sub-chapter 4.9, tangibility makes the lowest unique contribution to explaining the capital structure, when the variance explains by all other variables in the model is controlled for. Therefore, collateral value which is represented by tangibility is relatively less important to the creditors when deciding on the debt funding. Other factors such as macroeconomic environment, growth opportunities, profit margin, and the nature of industry may play important roles in determining capital structure of firms.

4.5 The Relationship between Profitability and Capital Structure

The result of bivariate correlation between profitability and debt ratio in Appendix 7 is summarized in Table 4.5.

Table 4.5: Summary of Pearson Correlation between PRO and DR

Parameter	PRO and DR
Pearson Correlation	-0.137**
Significance (1-tailed)	0.009
N	300
** Correlation is significant at the 0.01 level (1-tailed).	

Negative value of Pearson correlation at 0.137 clearly indicates that profitability and debt ratio are negatively correlated. It is statistically significant as confirmed by the small significance value of 0.009. Therefore, null hypothesis 4 is rejected based on this result. The alternative hypothesis which states that there is a significant relationship between profitability and debt ratio is accepted at 95% confidence level.

The significant inverse relationship between capital structure and profitability supports many findings from previous studies (Akintoye, 2008; Al-Najjar, 2008; Chen et al., 2009; Deesomsak et al., 2004; D'Mello and Farhat, 2008; Friend and Lang, 1988; Gaud et al., 2005; Pandey, 2004; Rajan and Zingales, 1995; Tan, 2005; Viviani, 2008).

This result indicates that pecking order theory appears to be more appropriate in explaining the behaviour of capital structure in relation to profitability for manufacturing firms in Malaysia. Therefore, an inverse relationship is observed. A profitable firm tends to have a lower debt ratio since it has

enough fund to sustain the business through internal equity financing and higher retained earning.

4.6 The Relationship between Growth Opportunities and Capital Structure

Pearson correlation analysis result between growth opportunities and debt ratio as presented in Appendix 7 is summarized in Table 4.6 as below.

Table 4.6: Summary of Pearson Correlation between GRO and DR

Parameter	GRO and DR
Pearson Correlation	-0.440**
Significance (1-tailed)	0.000
N	300
** Correlation is significant at the 0.01 level (1-tailed).	

Negative result of 0.440 for Pearson correlation and a very low significance value propose that growth opportunities are statistically negative correlated with debt ratio. Therefore, null hypothesis 5 is rejected in this case. The alternative hypothesis 5 which states a significant relationship between growth opportunities and debt ratio is supported.

The significant inverse relationship between growth opportunities and capital structure is supported by the findings of many researchers (D'Mello and Farhat, 2008; Drobetz and Fix, 2005; Gaud et al., 2005; Huang and Song, 2006; Rajan and Zingales, 1995; Wiwattanakantang, 1999).

This result indicates that trade-off theory appears to be more appropriate in explaining the effect of capital structure in relation to growth opportunities for manufacturing firms in Malaysia. High growth firms are said to finance growth by using internal equity rather than external debt in order to mitigate the idle capacity problem arising from risk debt (Benito, 2003; DeAngelo and Masulis, 1980; Hall et al., 2000; Jensen, 1986; Myers, 1984; Myers and Majluf, 1984; Zou and Xiao, 2006). Auerbach (1985) argues that the tax deductibility of interest payments is less valuable to fast growing firms since these firms usually have non-debt tax shields. Therefore, leverage ratio is inversely related to growth opportunities.

4.7 The Effect of Dummy Variable

In this study, the effect of capital structure between firms with more and less than fifty (50) percent of debt ratio is analysed by two methods. The first method is performed by comparing the two regression models with and without applying the dummy variable. This is done to evaluate which one of the models provides a better regression model with a better estimation in F-statistic value. The second method uses non-parametric test of Mann-Whitney U test to evaluate if there is any statistical difference between the median of capital structure for firms that use more and less than fifty (50) percent of debt ratio.

The regression results for the models with and without the application of dummy variable are presented in Appendix 7 and Appendix 8 respectively. The results of these two models are summarized in Table 4.7 and Table 4.8.

Table 4.7: The Effect of Independent Variables on Dependent Variable with Dummy Variable of 50% Debt Ratio

Variable	Coefficient	Std. Error	t-Statistic	Sig.
Constant	0.34449	0.032	10.677*	0.000
SIZ	0.01442	0.005	3.082*	0.002
ICR	-0.00719	0.001	-9.870*	0.000
TAN	0.09029	0.039	2.331*	0.020
PRO	0.55110	0.120	4.578*	0.000
GRO	-0.13842	0.018	-7.497*	0.000
DUM_50	0.31437	0.014	22.325*	0.000

Weighted statistics:

R^2	0.821
Adjusted R^2	0.817
SE of regression	0.09994
F-statistic	223.653*
Sig. for F-statistic	0.000
Mean of dependent variable	0.44436
SD of dependent variable	0.23370
Sum of squares for residual	2.927
Durbin-Watson statistic	1.992

Notes:

a. Dependent variable: DR

b. * Significant at 5% level

Table 4.8: The Effect of Independent Variables on Dependent Variable without Dummy Variable of 50% Debt Ratio

Variable	Coefficient	Std. Error	t-Statistic	Sig.
Constant	0.50595	0.052	9.807*	0.000
SIZ	0.04337	0.007	5.879*	0.000
ICR	-0.01342	0.001	-12.162*	0.000
TAN	0.15575	0.063	2.458*	0.015
PRO	0.65172	0.197	3.302*	0.001
GRO	-0.30216	0.028	-10.868*	0.000

Weighted statistics:

R^2	0.516
Adjusted R^2	0.508
SE of regression	0.16397
F-statistic	62.673*
Sig. for F-statistic	0.000
Mean of dependent variable	0.44436
SD of dependent variable	0.23370
Sum of squares for residual	7.905
Durbin-Watson statistic	1.992

Notes:

a. Dependent variable: DR

b. * Significant at 5% level

Based on a higher R-square (R^2) value (0.821) and a higher F-statistic result (223.653) with significant value of 0.000, obviously the first model with dummy variable is a better regression model. The firm characteristics (i.e. firm size, interest coverage ratio, tangibility, profitability, and growth opportunities) and dummy variable of fifty percent debt ratio for the first model help to explain 82.1% of the variance in capital structure. In comparison, even though the second model is also significant in F-statistic value, it has a lower F-statistic

value (62.673). The firm characteristics for the second model only help to explain 51.6% of the variance in capital structure.

Mann-Whitney U test is used to confirm whether there is a significant difference in capital structure between firms with more and less than fifty (50) percent of debt ratio. The test results are presented in Appendix 9. Mann-Whitney U test statistics are summarized in Table 4.9 and the median value for each of the two groups of firms are reported in Table 4.10

Table 4.9: Statistics of Mann-Whitney U Test for Debt Ratio

Statistics	DR
Leven	0.000
Wilcoxon W	12880.000
Z	-14.942
Asymp. Sig. (2-tailed)	0.000

a. Grouping Variable: DUM_50

Table 4.10: Median Values for More and Less Than 50% of Debt Ratio

DUM_50	N	Median
0 (DR < 50%)	160	0.242641
1 (DR > 50%)	140	0.649055
Total	300	0.473844

The significance level as stated by Asymp. Sig. (2-tailed) is 0.000. This result indicates that there is a statistically significant difference in capital structure between firms with more and less than fifty (50) percent of debt ratio. Therefore, alternative hypothesis 6 is substantiated. The difference between two groups of debt ratio can be seen by their median values. The median

value for firms with debt ratio below fifty (50) percent (DUM_50 = 0) is 0.24264 and the median value for firms with debt ratio above fifty (50) percent (DUM_50 = 1) is 0.64905.

This result is consistent with the findings by Eriotis et al. (2007) and Mat Kila and Wan Mahmood (2008). Both of these studies also indicate a statistically significant difference in capital structure between firms that use more and less debt capital. The only difference between these two studies is the cut-off point of debt ratio in which the former uses fifty (50) percent and the latter reduces to thirty (30) percent.

4.8 Firm Characteristics Differentiation between Firms with More and Less than Fifty Percent of Debt Ratio

T-test is used to verify whether difference exists in each of the five firm characteristic latent variables between firms that use more and less than fifty (50) percent of debt ratio. Details of the test results are reported in Appendix 10 to Appendix 14. The summary of these T-test results are tabulated in Table 4.11.

Table 4.11: Summary of T-Test Results for Five Independent Variables

Independent Variable	Levene's Test for Equality of Variances			T-Test for Equality of Means		Eta Squared	Final Result
	F	Sig.	Result	t	Sig. (2-tailed)		
SIZ	0.430	0.512	Equal variances assumed	-2.969	0.003	0.029	Accept alternative hypothesis
ICR	74.541	0.000	Equal variances not assumed	7.261	0.000	0.150	Accept alternative hypothesis
TAN	0.015	0.904	Equal variances assumed	0.386	0.700	0.000	Accept null hypothesis
PRO	10.733	0.001	Equal variances not assumed	2.666	0.008	0.023	Accept alternative hypothesis
GRO	55.244	0.000	Equal variances not assumed	7.061	0.000	0.143	Accept alternative hypothesis

Eta squared is calculated to provide an indication on the magnitude of difference if there is any. Based on the results in Table 4.11, there are statistically significant difference in firm size (SIZ), interest coverage ratio (ICR), profitability (PRO), and growth opportunities (GRO) between firms that use more and less than fifty (50) percent of debt ratio. Therefore, alternative hypotheses for H7, H8, H10, and H11 are supported. The magnitude of the differences (measures by Eta squared) in the means of firm size and profitability is found to be small with Eta squared equals to 0.029 and 0.023 respectively (Cohen, 1988, pp. 284-287). The magnitude of the differences in the means of interest coverage ratio and growth opportunities is found to be large with Eta squared at 0.150 and 0.143 respectively.

The significant value for tangibility is larger than 0.05. Therefore, null hypothesis 9 is accepted and alternative hypothesis 9 is rejected at the confidence level of 95%. There is no significant difference in tangibility between firms that use more and less than fifty (50) percent of debt ratio.

4.9 Regression Model

Based on the results discussed under sub-chapter 4.7, the first regression model with dummy variable of fifty (50) percent debt ratio is the most recommended model since it has the highest F-statistic value and R-square (R^2) value. 82.1% of the variance in capital structure is explained by the first model (with dummy variable) in comparison to 51.6% only by the second model (without dummy variable).

The coefficients of multiple regression technique are summarized in Table 4.12. The dummy variable is found to have the strongest unique contribution to explaining the capital structure since it has the highest magnitude of standardized coefficient beta (0.672), when the variance explains by all other variables in the model is controlled for. Interest coverage ratio appears to be the second strongest unique contribution to explaining the capital structure (0.333). The third strongest unique contribution factor is growth opportunities (0.204) followed by profitability (0.156) and firm size (0.088). Tangibility has the weakest unique contribution among the five independent variables and one dummy variable with beta value of 0.060. This is consistent with the earlier finding from the Pearson correlation analysis (sub-chapter 4.4) which indicates that there is statistically insignificant relationship between tangibility and debt ratio at confidence level of 95%. That's why tangibility is found to be the least significant in influencing capital structure in the model. In addition, the t-test result as discussed under sub-chapter 4.8 also substantiates this finding. It reveals that there is no statistically significant difference in the means of tangibility between firms that use more and less than fifty (50) percent of debt ratio.

Table 4.12 shows that all five independent variables and one dummy variable are found to be statistically significant in explaining the model at 0.05 level. Even though in the earlier bivariate test, tangibility is found to be statistically insignificant relationship with debt ratio at 0.05 level, it appears to be statistically significant in explaining capital structure when combines with other determinants in the proposed model. F-test is used to test the fitness of the

regression model. From Table 4.7, it portrays that F-value (F = 223.653) is significant at 0.05 level (p = 0.000). This again explains that the combination of variables used in this study is appropriate for the regression model. The relatively high R-square (R^2) value also supports the model. It indicates that firm characteristics (i.e. firm size, interest coverage ratio, tangibility, profitability, and growth opportunities) and dummy variable of fifty percent debt ratio together help to explain 82.1% of the variance in capital structure of firms.

Table 4.12: Summary of Coefficients for Multiple Regression Technique

IV	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0.34449	0.032		10.677	0.000
SIZ	0.01442	0.005	0.088	3.082	0.002
ICR	-0.00719	0.001	-0.333	-9.870	0.000
TAN	0.09029	0.039	0.060	2.331	0.020
PRO	0.55110	0.120	0.156	4.578	0.000
GRO	-0.13842	0.018	-0.204	-7.497	0.000
DUM_50	0.31437	0.014	0.672	22.325	0.000

The high value of Durbin-Watson statistic at 1.992 suggests no autocorrelation of the error term (Hill, Griffiths, and Lim, 2008, p. 239). Therefore there is no covariance between the random and independent variable and the error term does not affect the regression model. The final proposed regression model is given as below:

$$DR_{i,t} = 0.34449 + 0.01442\ SIZ_{i,t} - 0.00719\ ICR_{i,t} + 0.09029 TAN_{i,t} + 0.55110\ PRO_{i,t} - 0.13842\ GRO_{i,t} + 0.31437\ DUM_{i,t}$$